NASA Program Assessment
Process Study

Prepared by Science Applications International Corporation
(SAIC)
Arlington, VA

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Program Assessment Process Study

Background

NASA Headquarters (HQ) indicated a need for a user-friendly process to assess its programs and to research automated tools for assessing progress of its programs against plans. NASA programs, by their very nature, do not lend themselves to consumable product management techniques. (Most modern management tools are developed for programs that are hardware/software product oriented.) NASA's Aero-Space Technology programs are research efforts. Predictions of exact timelines, costs, and technical readiness levels (TRLs), in research programs, are not as straightforward as product-orientated programs.

Purpose

The purpose of this effort was to conduct a survey of the present and planned program assessment techniques throughout government and industry to determine the state-of-the-art and develop recommendations for the program assessment process in the NASA Office of Aero-Space Technology (OAT) Enterprise.

Approach

SAIC surveyed program management tools including internally developed tools in the SAIC "Common Approach to Program Management." SAIC also surveyed other tools for research organizations in the public literature for their applicability (ONR, DARPA, Lucent, etc.). SAIC queried the OAT Program Managers (PMs) for what they consider their measures of program performance and how they measure them. Particular emphasis was placed on automated tools or tools that could be automated. SAIC assessed these tools regarding their applicability to the NASA OAT Enterprise and its respective programs. Trials and demonstrations of promising program assessment tools were to be recommended and supported as a part of this effort.

Discussion

SAIC developed a questionnaire (Appendix A) to solicit opinions from the NASA PMs. The current schedule of reviews associated with each program appears daunting from a PM's perspective as well as from a HQ perspective. (See examples in Figures 1 and 2.) A more careful examination of these reviews reveals quite a bit of repetition in the data. Still, the program assessment workload is quite heavy. The results of the questionnaire are shown in Figure 3. The results support the arduous workload and allow for some suggestions for alleviating some of that workload.

In addition to the questionnaire, SAIC personnel did a survey of relevant research-oriented industry and government organizations, which included the following:

Department of Energy	Bell Labs (Telcordia)
University of California at Berkley	National Institute of Health

Office of Naval Research
DoD, DARPA

DOT, RASPA, FAA
SAIC-Telcordia

FY99 Management Schedule

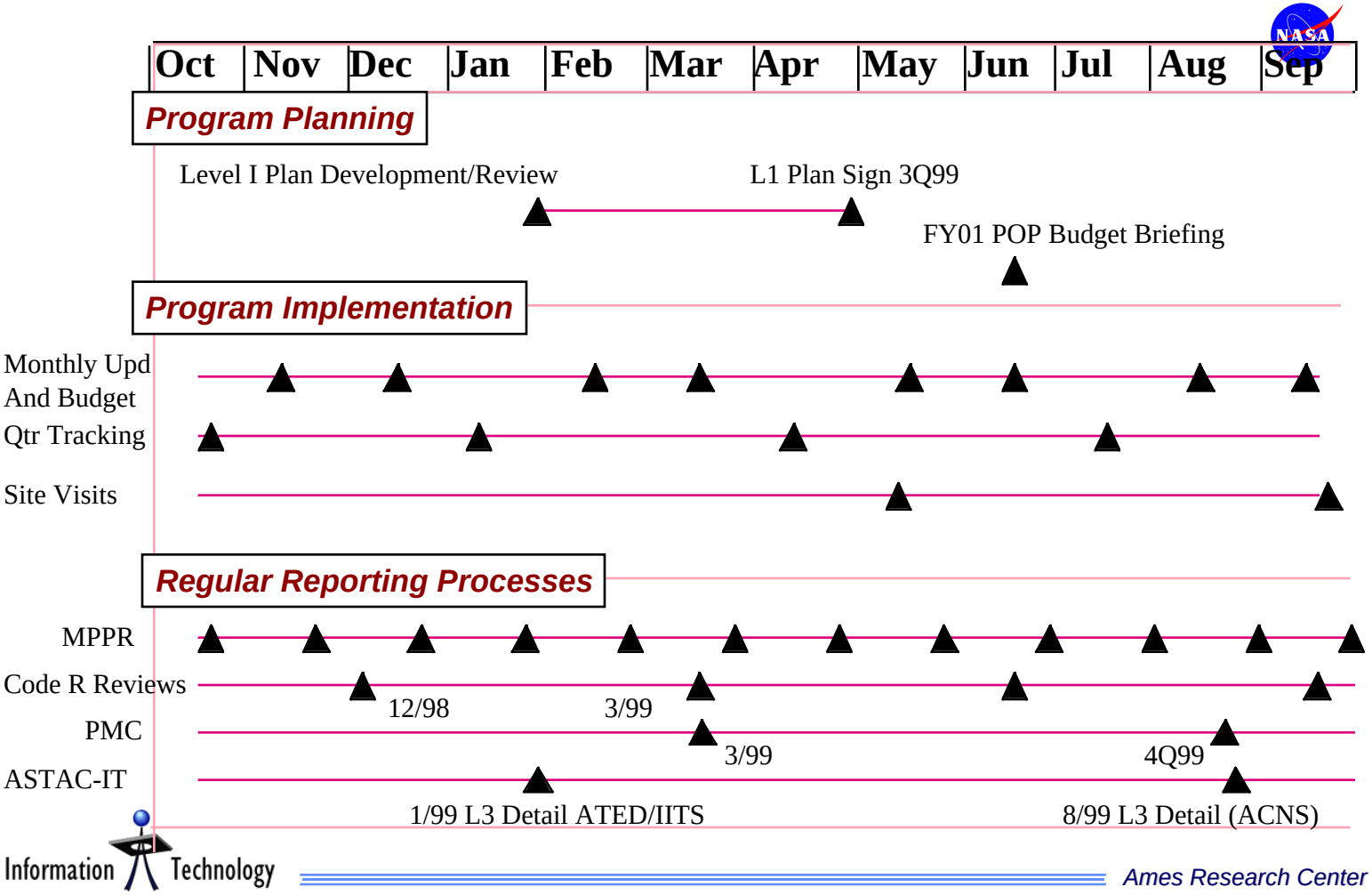

Figure 1: PM View of Review Schedule

Annual Planning and Review Cycle

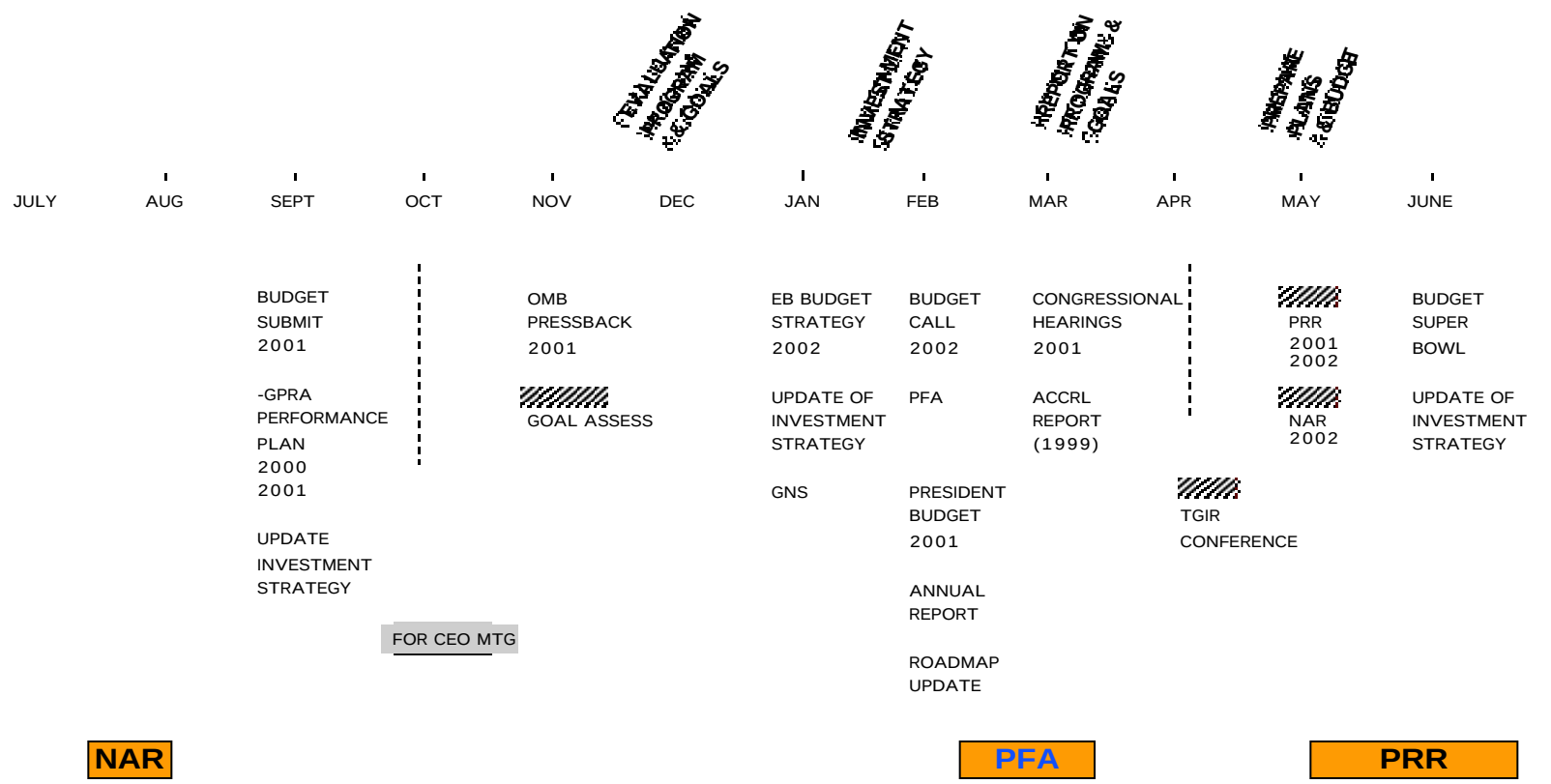

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Figure 2: Annual Planning and Review Cycle

Communication-Related
--Purpose of Review is to educate NASA HQ as Advocate
--Programs vs. Goals? Much confusion
--Cost & Schedule information is secondary
--PMs need more heads-up from HQ
--Why "firedrills?" HQ has long-term picture
--No Feedback from Reviews
--Are we doing things right? Are we doing right things?

Reviews-related
--Feedback from ALL reviews important
--Perhaps Focus & Base Programs=separate review processes (Focus on technology vs. financial/milestones)
--Reviews should show success/failure with customers/partners, impact to Goals, as well as C, S, & P--Independent peer reviews with paid members for unbiased evaluation
--Stakeholder/Customer involvement at Project Level
--PMs & a NASA HQ representative should attend ALL reviews
--Alternate Reviews at HQ and Centers

Format-related
--Standard format important—use MS Office
--Enter data once with several ways to manipulate
--Website allows for many different levels of input and access

Figure 3: Program Manager Questionnaire Results

Based on the results of the survey and the questionnaire, a briefing was prepared for Herb (Appendix B). The results show that there were no new techniques or automated tools that were directly applicable to the NASA research situation. There were, however, a number of changes that could be made to the assessment process that could ease workload for the PMs. NASA then asked SAIC to present the results to the PMs at the PM meeting. This was accomplished and the feedback from the PMs was subsequently incorporated into a final status briefing given at the PM offsite in St. Louis, MO (Appendix C). The minutes from the offsite can be found in Appendix D.

Results/Recommendations

Based on interviewing the NASA PMs, industry and research organizations, the following recommendations were given to NASA HQ, then to the PMs for review.

> --***Rotate monthly program reviews to the different NASA Centers***. This would not only change who is traveling but also allow different centers to demonstrate their technologies.

--***Create a user-friendly website for the Program Managers and HQ to use***. This should link to each program's existing website and to financial information. It should also have a Bulletin Board System for questions/answers between PMs and HQ. The website should be created with the purpose of information exchange. Each program should have a dedicated individual to update their respective website as necessary with accomplishments, patents, citations, publications and major points of interest. The financial information should be updated from the financial people as they have the most current information.

--***Ensure a standard format exists for all inputs and is known by all Program Managers***. Consistency is important to program success.

--***Assess each program for program risk via a probability risk assessment tool.*** This would justify any investment that NASA makes in its technology research.

--***Assess the Aero-Space Technology Advisory Committee (ASTAC) and Independent Program Assessment Office (IPAO) processes.*** This would ensure impartiality, technical expertise and national focus for the peers. By doing so, this will ensure an *independent* review of each program.

--***Apply bibliometrics to lower TRL Base programs***. Count publications, patents and citations as accomplishments. This will allow other forms of measurement when there is less of a product to measure milestones.

--***Have an offsite workshop to discuss the recommendations.*** An offsite meeting should be held every six months or so to get the PMs and HQ people away from their offices. No matter what NASA facility a meeting is held at, someone is always near their office that will inevitably attempt to accomplish work during or after the meetings. The offsite gives everyone a breather as well as allows them to concentrate on the issues at hand. An offsite meeting also allows for team bonding and building. This bonding would probably not take place at regular meetings.

At the workshop in St. Louis, which accomplishes the last recommendation, the other recommendations were discussed. The current status of those recommendations is seen in Table 1.

Recommendation	Complete?		Comment
Rotate reviews	**Yes**		Beginning FY 2000
Create website	**Yes**		In work
Ensure standard format	**Yes**		In work
Have workshop with PMs	**Yes**		And here we are :-)
Assess program risk		**No**	Probability Risk Assessment methodology
Peer review assessment		**No**	Independent assessment of process
Apply bibliometrics		**No**	Bibliometrics methodology

Table 1: Recommendation Status

The offsite in St. Louis accomplished a number of items for the PMs in addition to the results of SAIC's study being presented. Sam Armstrong, Mike Mann, Rich Christiansen, Bob Pearce, and Joe Elliott each spoke with the PMs regarding issues such as finances, agency direction, Code RP (Aero-Space Programs) direction, Code RG (Aero-Space Goals) direction and research investment.

The PMs were given an opportunity to work on management skills with Warren Blank, a leadership consultant for The Leadership Group out of Chapel Hill, NC. Warren conducted a Universal Keyboard exercise, a Tennis Ball exercise and a Shuttle exercise. Three points of the exercises were 1) to refresh the PMs' team-building skills, 2) remind them how important planning is to a project, and 3) that they *can* succeed with fewer resources if they are creative.

Herb Schlickenmaier spoke with the PMs on the 2nd day of the offsite on specific issues dealing with the PMs and their programs. One issue discussed was the set of questions received from the Office of Management and Budget (OMB). The PMs were given the task to respond to the questions and return them to Terry Hertz by the end of that week (September 10, 1999). The PMs discussed synergy, the role of the ASTAC subcommittees and measuring progress towards the Goals (Milestone discussion). They talked about the possibility of having a schedule where all program reviews are on the same calendar for all PMs to see. They also talked about having an offsite every 6 months to bring the PMs together at a neutral location. March was selected as a suitable month and San Antonio was a serious consideration for location.

One issue that came up at the offsite in St. Louis was a schedule or calendar for HQ and the PMs. Currently there is no master schedule for the PMs or HQ to refer to when

scheduling other events. If a master schedule existed and included the OMB, Congress, HQ and Program schedules, it might reduce the number of 'firedrills' that the PMs receive. They would be expecting certain requests at certain times of the year and could prepare appropriately. Having the calendar web-based would allow for easier updating. Also, if every program could select an individual responsible for the website calendar update, this would ensure it was completed by all programs. Many calendars are available via the Internet, which are user-friendly, are secure and would work well with NASA.

Conclusion

The Program Assessment Process study found that no new technologies or tools exist that can easily be tailored to NASA's unique research environment. The study did however, bring out some points for NASA HQ and the PMs to take into account when attending PM meetings or evaluating NASA programs.

--There is a need to ensure that the ASTAC subcommittees do a thorough impartial job in reviewing programs with the highest of technology expertise and national focus,

--An offsite every 6 months would ensure that PMs continue working as a team. It would ensure that they get an HQ/Code RP/Code RG perspective twice a year, and that they continue to interact with one another so they can help each other. An offsite would also ensure that they would be reminded of the lessons learned from Warren Blank and his exercises about teams, planning and creativity.

--A website review would allow PMs to make comments and suggestions which would make the website more useful to both HQ and the PMs, and

--A Probability Risk Assessment (PRA) would help each program to visualize the program's chances for success.

A PRA analysis should be done for both a Base and a Focus program. Data could be used from FY 1999 since the data exists or from FY 2000 since it would be real time.

Another task should be done again for both a Base and a Focus program applying standard program management tools to the programs once the full-cost accounting system is fully implemented.

These experiments and suggestions would help the OAT Enterprise accomplish its goal of a faster, better program assessment process. They would show how some of the suggestions from the study could help the PMs and HQ. The suggestions and experiments would also not create a total upheaval of the existing program assessment process. With some planning, creativity and honest effort, the program assessment process could a much more valuable tool to both the PMs and NASA HQ.

Appendix A

Program Manager Questionnaire

NASA Headquarters desire to update their automated tools for assessing progress of their programs. NASA programs, by their very nature, do not lend themselves to consumable product management techniques (Most modern management tools are developed for programs that are hardware/software product-oriented.). NASA's Aero-Space Technology programs are research efforts. Predictions of exact timelines, costs, and technical readiness levels in research programs are not as straightforward as product orientated programs. The purpose of this questionnaire is to solicit the NASA Program Manager inputs into the program assessment process. The following questions are meant to foment a discussion and should not be viewed as constraining. Keep in mind that responses are deemed non-attribution.

1. What message do you want to convey in your program reviews besides cost, schedule, & performance data?

2. What type of information do you think would help Headquarters evaluate your program?

3. What type of information from Headquarters would assist you in running your program?

4. What type of performance metrics do you use to measure your program?

5. What information do you see recurring in the different reviews that you prepare?

6. Do you feel that the information you are currently providing in your reviews is valuable? What other information might be more valuable? To your peers? To your bosses? To HQ?

7. Do you have any suggestions to make program evaluation more valuable, efficient and less time consuming? What would you like to see changed? What would happen if you didn't do your reviews for one cycle?

8. Have you seen/used any program management/evaluation tools/software that you feel might work well for NASA?

9. How do you handle MAJOR program changes/cuts? Contingency plans?

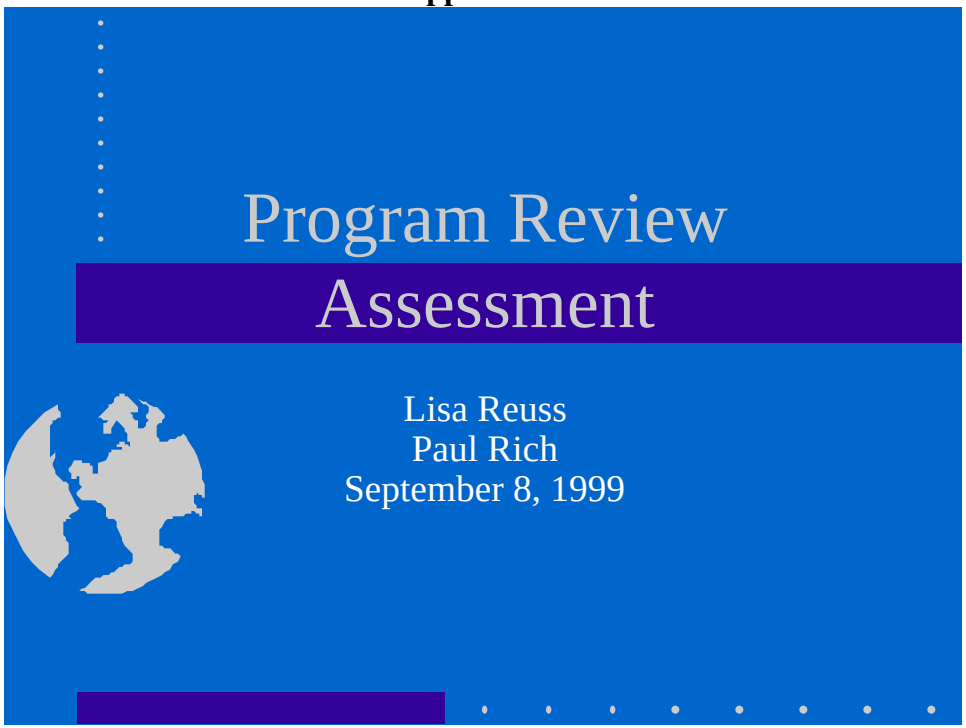
10. Comments?

Appendix B

Program Review Assessment

Lisa Reuss
Paul Rich
June 28, 1999

Appendix C


Program Review
Assessment
Lisa Reuss
Paul Rich
September 8, 1999

Appendix D

Minutes from
NASA Program Managers' Off-Site

St. Louis, MO

September 8 and 9, 1999

Program Manager Offsite
St. Louis, MO
September 8-9, 1999

Organization	*Program*	*Name*	*E-mail*	*Phone Number*
NASA Ames	Rotorcraft	Coy, John J.	jcoy@mail.arc.nasa.gov	650-604-3122
NASA Ames	AOS	Haines, Lynda	lhaines@mail.arc.nasa.gov	650-604-5151
NASA Ames	AOS/ASC	Lebacqz, Vic	vlebacqz@mail.arc.nasa.gov	650-604-5792
NASA Ames	IT/HPCC	Tu, Eugene	eltu@mail.arc.nasa.gov	650-604-4486
NASA Dryden	Flight Rsch	Regenie, Vicki	vicki,regenie@dfrc.nasa.gov	661-258-3430
NASA Glenn	Propulsion	Acosta, Waldo	waldo.acosta@grc.nasa.gov	216-433-3393
NASA Glenn	Propulsion	Berkopec, Frank	frank.d.berkopec@grc.nasa.gov	216-433-3942
NASA Glenn	UEET	Liang, Anita	anita.liang@grc.nasa.gov	216-977-7439
NASA Glenn	Propulsion	McCallum, Pete	p.mccallum@grc.nasa.gov	216-433-8852
NASA Glenn	PM Assess	Saiyed, Naseem	naseem.saiyed@grc.nasa.gov	216-433-6137
NASA Glenn	UEET	Seng, Gary	gary.seng@grc.nasa.gov	216-433-3732
NASA HQ	Education	Anderson, Bill	wanderso@hq.nasa.gov	202-358-4732
NASA HQ	Code RP	Christiansen, Rich	rchristi@hq.nasa.gov	202-358-2693
NASA HQ	Code RG	Elliott, Joe	jelliott@hq.nasa.gov	202-358-4733
NASA HQ	Integration	Landers, John	jlanders@hq.nasa.gov	202-358-4671
NASA HQ	PM Assess	Lynch, Bernice	blynch@hq.nasa.gov	202-358-4594
NASA HQ	Code RG	Pearce, Bob	rpearce@hq.nasa.gov	202-358-4595
NASA HQ	PM Assess	Schlickenmaier, Herb	hschlick@hq.nasa.gov	202-358-4638
NASA HQ	X-Planes	Sumrall, Phil	jsumrall@hq.nasa.gov	202-358-4474
NASA Langley		Darden, Christine	c.m.darden@larc.nasa.gov	757-864-5258
NASA Langley	Airframe Sys.	Hernandez, Gloria	g.hernandez@larc.nasa.gov	757-864-6033
NASA Langley	Aviation Safety	Jones, Frank	f.p.jones@larc.nasa.gov	757-864-5271
NASA Langley	Airframe Sys.	Tenney, Darrel R.	d.r.tenney@larc.nasa.gov	757-864-6033
NASA Marshall	X-34	Armstrong, Bob	bob.armstrong@msfc.nasa.gov	256-544-1863
NASA Marshall	Aero-Space	Buschmann, Sherry	sherry.buschmann@msfc.nasa.gov	256-544-3404
SAIC		Reuss, Lisa	lisa.m.reuss@saic.com	703-414-7032
SAIC		Rich, Paul	paul.rich@saic.com	703-414-7028
SAIC		Schulz, Cathy	catherine.l.schulz@saic.com	703-414-7024

NASA Program Evaluation & Workshop
Agenda

	Tuesday	Wednesday	Thursday	Friday
			Discussion &	
			Terms of Agreement	
8:00 AM		Introduction	--GPRA	
		Aero-space Technology	--Monthly Reviews	SAIC wrap-up
8:30 AM		**Program Mgt. Principles**	--LCPMCs	
		-Michael Mann	--HQ PMC QSRs	
9:00 AM		**Goal Division Products**	--IARS	
		& Processes	--ASTAC, SCs &	
9:30 AM		- Bob Pearce & Joe Elliott	Steering Committees	
		Program Division Products		
10:00 AM		**& Processes**		
		-Rich Christiansen		
10:30 AM			*Discussion*	
11:00 AM				
		Exercise-Warren Blank		
11:30 AM	***TRAVEL***	"Universal Keyboard"		
12:00 PM		*Working lunch*	*Working lunch*	
12:30 PM				
1:00 PM		**Lessons Learned in FY 1999**	**Terms of Agreement**	
		- Herb Schlickenmaier	--Roles of the MGRS Team	
1:30 PM		-products	the human element	
		-processes		
2:00 PM		**PAP**	--PRODUCTS	
		-Paul Rich & Lisa Reuss	--PROCESSES	
2:30 PM		**PMAS**		
		-Naseem Saiyed	*Discussion*	
3:00 PM				
3:30 PM			Roadmap for FY 2000	
			- Herb Schlickenmaier	
4:00 PM		*Exercise-Warren Blank*	*Wrap-up*	
4:30 PM		"Tennis Balls"		
		Shuttle Exercise		
5:00 PM				
5:30 PM				
6:00 PM	Welcome Reception	Social Dinner		

	(Light Buffet)	(Mike Shanahan's)	***TRAVEL***	

Day 1: Wednesday, September 8, 1999

Sam Armstrong & Mike Mann: Aero-Space Technology Principals & Expectations via Telecon

At 7:20 am, Herb opened briefly to say that there would be a telecon between the Program Managers (PMs) in attendance in St. Louis and Sam Armstrong and Mike Mann at NASA Headquarters. He briefly discussed the Office of Management and Budget questions that the PMs had received, then proceeded to call Headquarters.

Once Sam and Mike were on the telephone, finances, accomplishments and stories to Congress were discussed. Sam talked about the impact of technology: the need to be clear to Congress about the impact of technology, and the need to show Congress the accomplishments that have been made not just the tests that have been completed. He used noise reduction as an example.

Sam felt that the results from the programs could be shown to Headquarters in incremental steps. He said it was important to communicate *all* results and accomplishments to him and to visualize the end-user so as to frame strategy for future research differently than before. He noted that focusing on the articulation of output is very important when justifying programs.

Sam raised his concerns after recently hearing the Non-Advocacy Review (NAR) panel debrief of the UEET Project. He felt that the UEET Project could be better characterized/ publicized by showing its best elements and including its partnerships. Sam said that Goldin sees the direction of NASA's research being on a broad basis, not so focused. UEET was a good example of this.

Sam said that he would be speaking to OMB on September 17 and that he would be discussing X-Planes, Aero-Space Transportation Program (ASTP) and noise and emissions. He wanted to have a vision: a story line that he could use with OMB to show what the public SHOULD be appreciating in NASA research. He felt that currently his story line was at 45,000 feet and could stand to come down a few levels of detail. Sam wanted to know how he could characterize the benefits of the NASA Programs. He asked for a good story line for each major project. He wanted to see the questions returned from the PMs as soon as possible so that he could get his story straight.

Sam noted that the FAA is short on manpower. This is important to NASA for the reason that the FAA does some of its own research. If they aren't doing the aviation research then NASA should. He asked what the alternative to technical improvement might be to FAA systems: could it be new technology as in the Small Aircraft Transportation System (SATS)? Sam sees SATS as an opportunity to revitalize general aviation. There is a close tie between NASA and the FAA on SATS and the work is too important to the nation for NASA and the FAA to be on different frequencies. Something that stood out from Sam's talk was the following quote "If you keep doing what you've been doing, you'll keep getting what you've been getting." He felt that the NASA/FAA relationship needed to be strong, and publicized as so, in order for research to continue.

The main two points from Sam's talk were 1) PMs need to do a better job in communicating the results of how well they've done and what they've accomplished and 2) PMs need to do a better job in describing the impacts of their work to external customers.

Herb's Flipchart based on Sam & Mike

From Sam and Mike's discussion via telephone, Herb noted the following:

OMB is the current driver for the funds that NASA receives. In order to succeed in OMB, PMs need to be able to articulate the meaning of their products (relevance of the technology as well as the content).

Bob Pearce noted "Know the history of the person you want to influence. Know the history of your audience. Know how to tell your story. Sam is a good story teller (But needs the best facts)."

Herb stated that in order for NASA to say it's the best, it's got to *be* the best.

Herb then talked about extremes in the programs. He talked again about NASA being the best at what it does, but also about knowing the political winds that affect what NASA researches. Bob Armstrong asked "Do we have contingency plans in place should we have to take a $1 billion cut?" Herb's long response basically said no. One billion dollars was too large a cut for *just* the Aero-Space Technology Enterprise to take. The cut would *have* to go across all NASA Enterprises. He also said that the Aero-Space Technology Programs had "no fat" in which to take the cut from.

Bob Pearce -- Goal Division Perspective

Bob felt that publicity, marketing, and accomplishments would all build support for NASA across the country. He thought that a major policy theme might be Transportation: giving service, benefits, quality of life, and economic opportunity to the community. In order for the community to think NASA is the best, the community must be educated. NASA would receive more support if the community knew some of NASA's issues. Bob also noted that along with the accomplishments of NASA that their (financial) constraints should be shown. People won't know NASA is constrained unless someone tells them.

Lynda responded that people needed to know how aviation programs directly affected them in order for them to gain interest. She stated that most people in the US don't know that NASA represents aeronautics/aviation as well as space. She felt that NASA needed to take advantage of when issues arise in the news. NASA needs to be there saying what they're doing on these issues, just like the FAA does.

Herb brought up the Public Affairs Office (PAO), who can get the outreach necessary for educating the public. He also felt that partnerships with airlines and/or airports for "advertising" (i.e. – the magazines aboard commercial carriers) would be helpful. He said the advertising would show NASA's value to people. The partnerships would also help with the reduced resources. If the partners know the situation, they can help NASA.

Some questions and thoughts were brought to the PMs' attentions by Herb:

--Is there opportunity to market/publicize local programs for each PM?

--What about small firms working with NASA PMs? Could they start informal databases of

pertinent accomplishment information?

--Who is helping solve problems for local areas? (i.e. – ORD)

--How do we develop more innovative or other kinds of partnerships? What is in it for partners?
--What about the PAO? Can they help?
--What about the end-users? How do we identify what they really want? It is necessary to research and define what the users want.
--All technologies on NASA Roadmaps should lead to goals, not just funded programs.
--If goals change, programs need to deal with that accordingly.
--What about military application? Should that be taken into account when conducting research?

Bob Pearce thought it was important to measure progress towards the Goals and to calculate future progress towards the Goals (as in the system analysis being done at NASA Langley). He discussed the Figure of Merit, which was discussed in further detail later by Joe Elliott. Bob also talked about portfolio balance and investment strategy briefly. He thought it was important to disseminate results *and* to receive feedback from the customers.

Figure of Merit - Joe Elliott

Figure of Merit (FoM) formula = *Contribution * TRL*
$*Degree of Difficulty

Joe said that using a Figure of Merit allows one to determine the goodness of the technology products produced within the Aero-Space Enterprise and the progress towards the goals. A FoM could be calculated for all technologies contributing towards a goal. Taking the FoM for each technology would assist one in determining the progress being made toward the goal.

The technologies can be grouped by the year they are projected to reach Technology Readiness Level (TRL) 9. Models can be executed for each year containing at least one technology projected to reach TRL 9 in that year. All technologies "on" for each year will provide total progress toward the outcome goals. This will allow one to track projected agency progress. All technologies can be grouped by program for each year and run on/off (by program) providing relative program contribution toward the outcome goals. This will allow one to track a program's contribution. Each technology for a given year run on/off will provide relative technology contribution toward the outcome goals. This will allow one to track a technology's impact.

If the FoM analysis is done annually, the contribution the technology projects make towards the Goals can be determined.

Warren Blank -- Universal Keyboard Exercise

In order to illustrate team building, Warren Blank-President of The Leadership Group in Chapel Hill, NC presented on team building and ran some exercises to demonstrate team building. He opened his presentation by talking about business. He stated that for a strong business, some of the biggest

stumbling blocks are relationships and unexpressed/unknown expectations. To encourage change, he stated that "Doing what you've always done, gets you what you've always gotten". (Note that Sam said the same thing earlier in the day).

Warren then arranged for the PMs to play a game called the Universal Keyboard. He created a circle on the floor with scotch tape. He randomly placed numbers on pieces of paper from 1 to 31 within the circle. The object was to touch all 31 numbers sequentially as quickly as possible: they were being timed. He asked all participants to stand on the outside of the tape and presented the rules of the game:

--Only one person could be inside the circle at one time,

--Every person must touch a number,

--No person could touch two numbers in a row.

The first round, Pete McCallum took the lead and asked everyone to choose the numbers that they were going to touch. When given the "Go!" Pete called out the numbers and everyone touched their numbers appropriately. Warren was pleased but challenged the team to go faster. Pete then asked the participants to move closer to the numbers so that they would be able to touch them faster. At "Go!" Pete again called out the numbers but the team was able to decrease their time in touching all of the numbers. Warren again was pleased but told the team that he had seen even faster. The team then came up with the idea to find objects to reach their numbers without having to move and realized that they could call out their own numbers faster than with Pete calling them. The team broke Warren's previous record! After the exercise, he made the following comments and suggestions based on the morning's conversations and the exercise results:

--Communicate expectations,

--Continually clarify expectations,

--Have a market specialist,

--Have common goals,

--Give positive feedback – Make Me Feel Good About Myself (MMFG –AM),

--Learn from your mistakes—lessons learned,

--Share the lessons learned with others – feed *across* programs,

--Get to know other members – for diversity,

--Incentivize team – What's In It For Me? (WII – FM),

--Pass on opportunities – find a place to use resources,

--Comply with the same ground rules,

--Ensure stable teams – if the teams are not stable, then use training and coaching,

--Form an accounting system that allows sharing vs. competing,

--Test which rules are firm,

--Eliminate duplication – communicate knowledge,

--Take initiative.

<u>Rich Christiansen: Program Division Perspective</u>

During a working lunch, Rich discussed Focus and Base Programs with the PMs.

The ongoing Focus programs are 1) Aviation System Capacity (ASC), 2) High Performance Computing and Communications (HPCC), 3) the X-33, and 4) Pathfinder. He noted that NASA Headquarters controls Focus Programs.

Rich then discussed new/renewed programs like UEET, ALT, Intelligent Synthesis Environment (ISE) and Aviation Safety. He talked about the three main stories going up to Congress, which is new "stuff": SATS, Noise & Emissions, and ALT (a.k.a. Future Space Launch Development (FSLD)).

Rich also went on to talk briefly about the Base Programs: Space transfer & launch technologies (ASTP), Information Technology (IT), Propulsion and Power, Vehicle Systems Technology (VST), Advanced Subsonic Technology (AST-Recently cancelled), Aviation Operation Systems (AOS), Flight Research and Rotorcraft. He noted that the Lead Centers (LC) control the Base Programs.

Rich noted that IT, VST, Propulsion & Power were all synergistic elements. He had a concern that maybe these were the only areas of synergy and that there was room for more synergy between the other programs as well.

Herb – Program Assessment

Herb then discussed the peer review process by the Aero-Space Technology Advisory Council (ASTAC) subcommittees. He said that they review cost, schedule, and performance via the following assessments:

(1) Government Performance and Results Act (GPRA) Assessment
(2) Independent Annual Review (IAR) for Base Programs (to look at past performance)
(3) Figure of Merit (FOM) for Goals (to look at future performance)

He noted that upcoming meetings were AOS 9/29-30; IT 9/21-22; and PS 9/28-29. Herb asked the question: what subcommittee is reviewing AvSP IAR type items? He also asked what the process for assessing next year's GPRA was and the status? NO response was given to either question.

ACTION: Herb: Come up with the role of the ASTAC subcommittees as they apply to Base & Focus Programs. (*Complete: Herb has emailed slides relating to this issue to the AOS, Powerplant, IT, and Airframes Programs as their subcommittees came up or are coming up*).

Paul –Program Assessment Process Study

Paul spoke on the results of SAIC's Program Assessment Process Study. The study involved talking with most of the PMs, industry and academia. It also included recommendations, by Paul and Lisa, for changes to improve the Program Assessment Process. They then presented those results to the PMs for comment. After discussion with the PMs, the ultimate recommendations to Herb and the Program Assessment Process were as follows:

--Create a user-friendly website for communication and information exchange between the PMs and Headquarters,

--Rotate program review locations,
--Ensure standard format for input to Headquarters,
--Include a feedback slide for PMs to ask questions of Headquarters,
--Include a free-form slide for highlights, lowlights, advocacy, etc.,
--Perform program risk assessment for each program,
--Ensure ASTAC and IPAO perform *independent* reviews,
--Apply bibliometrics to low TRL programs and base research.

The PMs were in agreement with most of the recommendations given except for the bibliometrics recommendation. Vicki Regenie pointed out that the Administrator didn't like bibliometrics because a person can rewrite a paper five times, five different ways and have it count towards program performance five times. SAIC agreed with the point Vicki made but noted that NASA could probably monitor for such activity.

Naseem Saiyed – Program Monitoring & Assessment System

Naseem's task was to write a paper on how to improve the program assessment process based on his time at Headquarters. This was his presentation.

Naseem said that program assessment was necessary to assure correlation between investment strategies and programs/projects. He made a note that National needs and personnel change with time and that assessment keeps programs on the right track. Ultimately, when assessing a program, one would want to measure the progress of each program toward its purpose and objective.

Naseem's presentation was primarily on the Program Monitoring & Assessment System (PMAS). His conclusion was that a system could be created that would take into account all factors of program management decisions and that it could greatly assist the PMs as well as Headquarters in program assessment.

He discussed the importance of the human element in program management. He felt that there was a fundamental need for personnel to know that they indeed matter, and that they can make an impact. How to motivate personnel is the difficult part.

Warren Blank – Tennis Ball Exercise

The first afternoon exercise with Warren was the Tennis Ball Exercise. The idea behind the exercise was to show that any team could work with constrained resources with a little creativity.

The participants were taken outside and given some tennis balls. They were told to bounce the balls to each other and count the number of catches for the whole group. The problem was that each person could only count the number of catches that the person with the lowest attempts at catching the ball had.

The first round was very disorganized as people were just bouncing balls to whoever they wanted. The count wasn't very high because some people only had the chance to catch 1 or 2 balls, so everyone could only count the lowest number of chances. Warren thought the team could do better so he took some of the balls away. The team decided (no one person took charge) to line up into 2 lines facing each other and bounce the balls across back and forth. This worked better but due to the fewer balls, some people were only given a few chances to catch the ball. This again affected the total points for the team because everyone could only count those catches up to the lowest number of attempts. The exercise was tried one more time and given even fewer tennis balls. This time the participants broke into small groups realizing that smaller groups would ensure more attempts at catches, therefore allowing for more points to be counted. The team did real well this time and proved that with some creativity and planning that a team can succeed even with fewer resources.

Shuttle Exercise

The participants returned to the meeting room to Warren rearranging the tape on the floor. He had one more exercise to show that planning resulted in success.

Warren created 5 circles that were approximately 2 feet across. He explained that these circles were shuttles. The team was on the Earth and it was getting ready to explode. The team's mission was to get everyone off of the planet via the shuttles within 15 seconds of "Go!" The only way that each shuttle would make it off of the planet was if all members in that shuttle were completely inside their circle for 15 seconds. The only way the mission was a success was if ALL shuttles succeeded.

Warren gave the participants 1 minute to devise their plans. The team broke up into 5 different groups ranging from 2 to 5 people per shuttle. They tried to squish into their shuttles. They tried to stand on each other. They tried holding onto each other and balancing. The first attempt failed as people could not balance and fell out of their shuttles or stepped on the tape. Warren game the participants a second chance to devise their method of survival. The second time, the teams failed due to again trying to squish or trying different positions. People fell off their shuttles. The last attempt was a success! The teams realized that if they took their shoes off and only put one foot into the circle and held onto each other, that they could balance each other and stay inside the shuttle for the 15 required seconds.

Again, this exercise showed that with creativity, planning and attempts before the actual test, that they could succeed at their mission. This exercise, as well as the tennis ball exercise, gave lessons that could easily apply to the participants every day lives.

Warren ended the exercises and day by giving each team member a little astronaut to remind them of the lessons they learned in the exercises. He called the astronaut the anchor to the lessons with which each member could apply to his/her daily lives.

Some comments from Warren on the results of the game were as follows:

"Your group's strength was quickly adapting new ways to accomplish the task. The challenge they seemed to face in round one was that no one emerged to direct the group during the uncertainty of the

new task. In the subsequent rounds, many people jumped in, and no one person played the role of overall coordinator. Does that translate into how things occur in real life for the group? If so, perhaps the group could set up a system to enable someone to pause the group and play the lead role.

See Appendix A for later comments to Herb from Warren.

Day 2, Thursday, September 9, 1999

Herb Schlickenmaier – Program Manager Discussion

Herb commented on Wednesday's activities briefly then began talking about Program Plans. He said that Program Plans traditionally were done independently. He felt that the PMs should consider teams to collaborate in the writing of the Program Plans with an eye towards considering the milestones and goals.

After that discussion, Herb began to discuss the top three topics input from the PMs. Those topics were 1) Synergy, 2) Role of ASTAC, and 3) Measuring progress towards Goals.

1) Synergy: There was some discussion, when this topic was brought up, as to the dependency of programs and the definition of synergy. It was decided that dependencies happen due to knowledge and that a rule was not required for them to occur. The definition of synergy was discussed. The result of the synergy discussion was that coordination is the key.

Herb and the PMs then discussed the mechanics of synergy. The point of synergy is to minimize program risk. One way to do that is to integrate Work Breakdown Structures (WBS) with ultimate responsibilities. Another way to accomplish synergy is to establish agreements between programs. Guidance is certainly necessary, but the question is, who is ultimately responsible? Perhaps one program is responsible for execution, but there needs to be a way to ensure that all programs get credit for their work. All PMs were in favor of partnerships but Program Plans are still being done independently. This makes it difficult to create partnerships. Knowledge is power in this case.

An example was given with the PDE Program. Propulsion and power is responsible for the execution of the program. RevCon achieves its goal. Spaceliner 100 achieves its goal. All is done for the betterment of the Aero-Space Enterprise.

OMB Discussion

Sam Armstrong was to attend the OMB meeting on September 17 and was looking for a good story to tell. This topic came up again after the Synergy discussion.

ACTION: It was everyone's responsibility to respond to their OMB questions and get them back to Terry Hertz by 1:00 pm Friday, September 10th. (*Complete*)

Some of the questions needed answering by the PMs. Those assignments were as follows:

Draft plans

#16 – Regenie – RevCon (Draft proj. by 9/17)
#17 – Regenie
#18 - Liang/Seng
#19 - Tu
#20-22 - Armstrong

2) Role of ASTAC: After the OMB discussion, there was some talk concerning ASTAC roles and dates for ASTAC subcommittees.

Those dates were as follows:

IT-September 21-22 (At NASA Ames)

Propulsion – September 28-29 (At NASA Glenn)

AOS – September 29-30 (At NASA Glenn)

Airframes – October 27

Main ASTAC – October 28-29

3) Measuring progress toward the goals: There was little comment due to the previous day's discussions on Figure of Merit.

Lastly Herb led a milestones discussion. The PMs decided that they need a mechanism to establish GPRA milestones as well as program milestones. They also thought that the timing between both sets of milestones should be better coordinated. The PMs thought that an annual calendar that incorporated all programs with their different dates listed, would be invaluable.

ACTION: SAIC: A calendar of a full year showing all reviews for all programs. (*In progress*)

These dates all belong on the calendar:

Subcommittee meetings	PM Calendar Should Show
PS 9/28-29 GRC	LCPMCs, ARs, NARs. HQPMC
IT 9/21-22 ARC	OMB reqs, ASTACs
AOS 9/27-30 GRC	
ASPO 12/7-9; LCPMC 10/27	
ASTP LCPMC 11/11	
Program plan	milestone baseline 10/1
EB 11/9-10	
Next PM meeting 9/21	
11/16-18 @ HQ Goal Subcommittee	

ACTION: Herb – More information relating to GPRA needs to be sent to PMs (Especially to Lynda Haines) (*In progress)*

ACTION: Herb --ASTAC SC, Lessons Learned from the Bud Bowl, and Strategic Plans for Goals all need to be sent to the PMs! (*Open*)

ACTION: Herb -- Check on this: Additional documents and 6 forms required? (Benji?) (*This issue was closed due to no forms being required.)*

More discussion came about regarding Program Plans. There was a question as to the format, the timing, and changes to be made to the Program Plans. The ASPO was on approximately revision 27, but hasn't seen a signed copy. Is it still good for daily reference? Terry needs to sign off on the format for the Program Plans if they're going to be honored. He should see Darrel's, Vickie's and Frank's as examples for comment. Terry needs to agree with the format by September 21, 1999 in order for Programs to continue. Program Plans should be sent to John Landers.

Deviations were discussed between NASA document 150 and 7120.5A for format.

ACTION: Herb -- Look into the deviation. (*This issue was looked into and discussed at the September 21st Program Manager's meeting and resolved.)*

After discussion about the format of the Program Plans, Herb brought up the fact that the NASA Strategic Plan was being circulated with changes for Goals 4, 7, 8, and 9.

Herb then wrapped up the second day of the Program Manager's Offsite meeting with a summary of the two days of discussion. One question that he brought was the question of another offsite meeting. Did the PMs want to have another one and when? They agreed that the offsite was a good idea and that March was a good timeframe (six months from this offsite meeting). The date was discussed, due to Darrel's urging, since everyone was in attendance, but some folks did not have their calendars readily available and updated for the discussion. Also, would the presentations given be sent to the PMs? Herb told the PMs that he would post the presentations given at the offsite, on the Internet for everyone's use. He thanked everyone for their participation and cooperation, and thanked SAIC for their help. He then reminded everyone that the next PM meeting would be held at NASA Headquarters on September 21 and that he looked forward to seeing everyone again then.

ACTION: Herb: Post all presentations given at the offsite meeting on a website for the PMs to access. (*In progress--Most presentations have been posted at the following site:* ftp://ftp.hq.nasa.gov/pub/oastt/1999.09.08-09-STL/)

ACTION: PMs: Choose a date for the March offsite meeting in San Antonio, TX. (*Open*)

Appendix A

From Warren: Dear Herb,

Thanks for your note of a couple days ago. I enjoyed the chance to work with your group. I agree. You do have an excellent team.

Below are the supportive team relationships and clear expectations the group established. Please distribute them with a short note encouraging the group to apply them. In a few weeks, I will send you another version of the same information formatted as a self-assessment. Participants can complete the assessment and use it as a discussion piece to continue their positive work group development.

In terms of an evaluation of the group, I have the following observations:

1. The group discussions revealed some positive dynamics within the group:
a. Members are generally very respectful when their colleagues are speaking; rarely did anyone interrupt the speaker; rarely did anyone make a harsh or negative comment about anything said by a speaker
b. Members frequently demonstrated positive "inquiry" skills when someone was
Speaking; that is, they asked for more information, clarification, or additional explanation in an effort to really understand what their colleagues were saying
c. The general tone of discussion was focused and sincere with touches of humor at appropriate points

2. The group discussions may not have been as productive as possible because:
a. Speakers often tended to lecture or present more than attempt to engage the group
b. As many of the group members kidded each other, the PowerPoint slides contained too much information on a single screen (type was too small and too much data was put on a single slide) and did not use enough of some the simple features PowerPoint offers to improve the presentations (e.g., the animation features for bringing in text-graphics)

3. The simulations I used clearly showed how a positive team dynamic could emerge:
a. Members showed how they could share the leadership role to maximize group productivity
b. Members demonstrated they could quickly learn from their experience and use innovative thinking and action to improve results
c. Members showed how they are internally motivated to support each other and achieve higher results

4. The group clearly demonstrates a high level of commitment and interest in their task. People really showed how much they care about the work they do.

This information should be in future group meetings as reminders and reinforcements of the team's effective practices. That is, you could remind them of their successes in the simulations and ask them to apply those same skills and motivations to particular tasks. You could also ask them to reflect on ways they could improve their behaviors based how they functioned during the St. Louis session.
I also want to give you some feedback on the role you played when you gave your presentation. I was very impressed with your effective "facilitation" skills. Facilitation means to "make things easy." You frequently used words and phrases that constructively extended conversation, engaged people to talk more, and encouraged people to explore ideas. You could use your own model to coach others when they are speaking/conducting a meeting.

So, overall Herb, you have an effective team. It could be improved with some slight polishing. And, you are in good shape.

Please let me know if you have any questions about this information. I look forward to working with you again. Thanks for the opportunity to be a part of the very exciting work you are doing at NASA.

Regards,
Warren Blank

Later from Warren: Dear *Herb,*

I reformatted the group's take home actions into a self-assessment.

I have included some suggestions on how to administer it. You might try this in about 30 days. Keep me posted on your progress.

Regards,
Warren Blank

Take Home Actions - Self-Assessment

This self-assessment should help you evaluate the effectiveness of the actions the NASA group based on actions the group created at the September 1999 off-site. The assessment is also designed to help you evaluate your success in applying the actions.

Rate yourself using the scale below on each of the actions.

N = No opportunity to apply
U = Did not understand what the action meant so did not try to apply it
D = Did not believe it would make a difference taking this action so never tried to apply it
T = Simply never made the time to apply the action
1 = Applied the action but got no support so discontinued trying
2 = Applied the action but got not meaningful results so discontinued
3 = Applied the action and got some meaningful results so continued taking the action sometimes
4 = Applied the action and got very meaningful results so continued taking the action regularly

Conduct a group discussion with other team members and compare your scores.

Consider ways to create opportunities for those actions rated "N."
Clarify the intent behind those actions rated "U" and establish more clearly understood actions.
Develop alternate actions for those rated "D."
Make a specific commitment to apply actions rated "T."
Determine how to get-provide support for actions rated "1."
Assess the reasons behind the actions rated "2" and commit to alternate actions that could get results.
Discuss ways to maximize the impact of those actions rated either "3" or "4."

By having this discussion together, your group will enhance each person's capacity to realize "take home value" and make a positive improvement for the group and for NASA. Please contact me if you have any questions about this assessment: leaderwb@aol.com or 919 933-0077.

To create a more positive team, I have...

_____ 1. Communicated my expectations others
_____ 2. Continually clarified my expectations to others
_____ 3. Sought out a marketing specialist
_____ 4. Created common goals for the group

_____ 5. Provided positive feedback - MMFG-AM - to others
_____ 6. Conducted "lessons learned" - learn from mistakes - analyses
_____ 7. Shared lessons learned information with others so they can learn
_____ 8. Provided feedback across programs
_____ 9. Gotten to know the other members - used diversity as a strength
_____ 10. Created incentives for working as a team - WII-FM
_____ 11. Passed on opportunities I could not use; found places to use resources
_____ 12. Complied with the grounds rules
_____ 13. Sought ways to keep team membership stable
_____ 14. Provided training and coaching from new members when team membership changes
_____ 15. Formed an accounting system that allows sharing vs. competing
_____ 16. Tested which rules are firm
_____ 17. Eliminated duplication - communicated knowledge so we don't reinvent the wheel